

# 张拉荷载下砂浆锚固岩石锚杆的力学分析

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**摘要** 砂浆锚固岩石锚杆在张拉荷载下的轴向应力和剪应力分布非常复杂, 为了研究这一问题已经进行了大量的试验, 根据这些试验得到的应力分布曲线和相关结论, 用比较简单的数学表达式对锚杆交界面上的复杂的剪应力分布情况进行理论描述。在交界面已经破坏的部分, 剪应力近似为0, 随着锚杆埋深的增加剪应力由0线性增加到其抗剪强度, 然后再呈指数形式衰减到0。根据上述数学描述进行实例计算, 计算得到的轴向应力和剪应力分布曲线与实测应力分布曲线基本吻合, 表明用数学表达对锚杆交界面上的剪应力分布情况进行比较准确的描述是切实可行的。

**关键词** [岩石力学](#); [锚杆](#); [张拉荷载](#); [应力](#)

分类号

## ANALYSIS OF MECHANICAL BEHAVIOR OF FULLY GROUTED ROCK BOLT UNDER TENSILE LOAD

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### Abstract

The distribution of the axial stress and shear stress along fully grouted rock bolt under tensile load is very complex. Many experiments have been done for this purpose. Based on the conclusions and the distribution of the stress gained by experiments, the shear stress distribution of fully grouted rock bolt can be described theoretically by some mathematical expressions. The shear stress is zero in some zone where decoupling appeared. The magnitude of the shear stress linearly increases from 0 to the peak shear strength at the interface which has no decoupling. And then the shear stress decreases exponentially to 0 with increasing bolt embedded length. An illustrative example is introduced. The calculated stress curve of the bolt is consistent with experiment conclusion. It reveals that the distribution of the axial stress and shear stress along a full grouted rock bolt under tensile load can be described by this method.

**Key words** [rock mechanics](#); [bolt](#); [tensile load](#); [stress](#)

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